ASSETS AT RISK & THE WILDLAND URBAN INTERFACE - WUI

The primary goal of wildland fire protection in the Butte Unit is to safeguard the wide range of assets found within the unit from the effects of wildfire. The wildland fire protection system was created and funded to protect both public and private assets at risk. The following have been identified and delineated as either economic or non-economic assets at risk from wildfire: people, structures, timber, watershed, wildlife, unique scenic and recreation areas, range, and air quality. The table below provides a description of the assets evaluated.

Asset at Risk	Public Issue Category	Location and ranking methodology
Hydroelectric power	Public welfare	1) Area watersheds that feed water to hydroelectric power plants, ranked based on plant capacity; 2) cells adjacent to reservoir based plants (Low rank); and 3) cells containing canals and flumes (High rank).
Fire-flood watersheds	Public safety And Public welfare	Watersheds with a history or the potential to develop problems as a result of fire or floods are ranked based on affected downstream population.
Soil erosion	Environment	Watersheds are ranked based on erosion potential.
Water storage	Public welfare	Watershed areas up to 20 miles upstream from water storage facility, ranked based on water value and dead storage capacity of facility.
Water supply	Public health	1) Watershed areas up to 20 miles upstream from water supply facility (High rank); 2) grid cells containing domestic water diversions, ranked based on number of connections; and 3) cells containing ditches that contribute to the water supply system (High rank).
Scenic	Public welfare	Four mile viewshed around Scenic Highways and 1/4 mile viewshed around Wild and Scenic Rivers, ranked based on potential impacts to vegetation types (tree versus non-tree types)
Timber	Public welfare	Timberlands ranked based on value/susceptibility to damage

Range	Public welfare	Rangeland ranked based on potential replacement feed cost by region/owner/vegetation type
Air quality	Public health, Environment And Public welfare	Potential damages to health, materials, vegetation, and visibility; ranked based on vegetation type and air basin
Historic buildings	Public welfare	Historic buildings ranked based on fire susceptibility
Recreation	Public welfare	Unique recreation areas or areas with potential damage to facilities, ranked based on fire susceptibility
Structures	Public safety And Public welfare	Ranked based on housing density and fire susceptibility
Non-game wildlife	Environment And Public welfare	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Game wildlife	Public welfare Environment	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Infrastructure	Public safety Public welfare	Infrastructure for delivery of emergency and other critical services (e.g. repeater sites, transmission lines)
Ecosystem Health	Environment	Ranking based on vegetation type/fuel characteristics

The assets at risk were evaluated to the 450 acre scale within the Butte Unit. The 450 acre scale, know as Quad 81st have been designated by the Department for purposes of manageability. This designation is based on the sectioning of a USGS 7.5 minute quadrangle map broken down into a 9x9 grid pattern; the result is squares of 450 acres. Fire plan assessments have been made at the Q81st level. For instance, each Q81st in Butte Unit has a ranking applied to it for Assets at Risk (AAR), Level of Service (LOS), and Fuel Hazard Ranking.

Fire protection resources are limited, primarily due to budget constraints. Therefore, these resources should be allocated, in part, based on the magnitude of the assets. The assets are ranked, high, medium and low, as to their susceptibility to wildfire. (For more information regarding the evaluation of asset susceptibility, refer to the California Fire Plan. http://www.fire.ca.gov/FireEmergencyResponse/FirePlan/FirePlan.asp The asset ranking is scaled to the Q81st and transferred to GIS maps. Map overlays will be evaluated by unit staff, and areas with the highest combined asset values and fire risk will be targeted for fire management activities. The scores for the various assets at risk where given a 1 (low) score out of a possible 9.999 (high) except for the following assets: game wildlife, historical buildings, and ecosystem health were all given scores of 0 as the data is not yet available or in different stages of validation at a state level. Infrastructure, non-game wildlife, and range scores were given a score of 2. Timber was given a 3 and structures were given a 5 (see priority areas in the Butte Unit fire plan). Many factors are involved in target area identification, including political climate of the region and suppression cost reductions.

The process of explicitly enumerating assets at risk also helps to identify who benefits from the protection afforded those assets. It is a premise of the California Fire Plan, from which this plan is structured, that those who benefit the most from the protection of an asset should pay the most for that protection.

STRUCTURAL IGNITABILITY AND HOME DEFENSE

Arguably one of society's most critical assets and one of the most difficult and costly for fire agencies to defend during a wildfire, homes and other structures are often lost because the materials used to construct them are not sufficient to resist firebrand ignition. During firestorms fires are often fanned by very strong winds creating a blizzard of embers which blow though the air. These embers often land in a receptive fuel bed, typically made up of fine dead fuels, which allow new fires to readily start; including fires on, under and near homes.

This fine dead fuel bed can include naturally occurring materials, such as needles and leaves that accumulate on, under and near your home, material stored on or near the home such as yard furniture or woodpiles, and some types of building materials. Building materials that lend themselves readily to "structural ignitability" include the obvious shake roof and the not so obvious deck material and interior support members in the attic or sub-floor space.

"Structural Ignitability" is a term now used commonly by the fire service, fire safe councils and the building industry to describe a structures susceptibility to catching fire during a wildland urban interface fire. This section aims to educate readers and stress the importance of "structural ignitability" **in addition to defensible space** when it comes to protecting structures from wildfire. It is not enough to have defensible space without giving careful thought and effort toward improving the homes resistance to structural ignitability.

Structural Ignitability Mitigation Strategies – The below table can be used by citizens, communities and governments to help identify the risks and mitigation measures that can be implemented to reduce the risk of structural ignitability to a home or community during a wildland urban interface fire.

While there are numerous factors which contribute to homes and communities being at risk to loss from wildfires, including hazardous fuel conditions, structural ignitability is arguably the most critical element to home survivability during a wildland urban interface fire. Many structural ignitability factors are easily mitigated with little time and expense to homeowners; while other building construction elements, such as wood shake roofing material, can require a significant investment on the part of property owners. Property owners must not downplay the risk caused by this type of construction, and determine the cost to benefit when making evaluations.

The goal of this section is to:

- To identify circumstances and factors which place the structure itself at risk from wildfire, and suggest appropriate mitigation measure(s) to reduce that risk. The mitigation measures can be evaluated and implemented by individual property owners,

communities, and local and state government. The resulting goal is to improve public safety, firefighter safety, reduce structure ignitability, and reduce damage to property and natural resources.

The objectives of this section are to:

- Identify risks and mitigation measures in terms of structural ignitability.
- Improve citizen knowledge regarding the risks of structural ignitability and empower property owners to implement mitigation measures to reduce their risk.
- Identify areas where collaborative efforts of local and state government can mitigate risks of structure ignitability through development standards, ordinances and codes.
- Support efforts of fire chiefs, local governments, county and community fire safe councils, the California Department of Forestry & Fire Protection (CDF), and other agencies to collaboratively implement mitigation measures and obtain funding assistance.

MITIGATION MEASURES BY FOCUS AREAS:

Focus areas are broken down into elements which contribute to the risk of homes and communities being lost to wildfire. A statement of the situation or issue has been presented, followed with a mitigation recommendation(s).

Item	***Focus Area***	
A.	**Reducing Structure Ignitability**	
	General Risk Condition:	
	First priority for mitigation actions are within the home ignition zone (reference "A Homeowners Guide to Fire Safe Landscaping in Butte County" released by the Butte County Fire Safe Council) which includes the structure and the first 10' around the structure. Research shows that building materials, landscaping and landscape materials, and natural debris such as pine needles and leaves that accumulate on and around structures within the home ignition zone play a significant role in home survival. Case studies have shown that over 80% of structures which are lost to wildland fires have wood shake roofs. This zone is critical to home survivability, firefighter safety and the affectiveness of suppression resources that may be providing structure protection to a residence during a wildland fire. It is incumbent upon property owners to evaluate their home – inside and out – for fire safety and start immediately to improve the chance of your home surviving. Do not wait until the time of the fire – that is too late. Consult your local fire department or fire safe council for further assistance.	
A.1.	**Existing structures & attachments -** Strengthen building standards for construction, replacement activities, and enforcement of compliance for existing residences and properties to make them less prone to loss from a wildfire due to embers, radiated heat, or surface fire spread.	
Item	***Risk Condition:***	***Mitigation Measures:***
A.1.a.	**Roofing -** Efforts should be	1) **Educate resident on**

	made to eliminate all wood shake roofs in Butte County. **Shake roofs are a leading cause of home loss in wildfires.** Presently homeowners in Butte County are allowed to replace up to 50% (as repair) of an existing roof per year. This has allowed a continuation of wood shake roofs in the county. Research show that homes with non-combustible roofs and clearance of at least 30-60 feet have a 95% chance of survival in a wildfire. Currently county & city codes do not allow wood shake roof for new construction. **Maintain 100' of defensible space per PRC-4291.**	**importance of replacing wood shake roofs -** Educational efforts should be made to eliminate shake roofing. 2) **Consider modifying county & city code measures which may include, but not be limited to:** a) **Limit replacement of shake roofs -** It may be possible to stop this practice by reducing replacement standards (e.g. from 50% to not exceed 10-15%). b) **"Reduced or No Fee" permits for replacement of shake roofs -** investigate a "reduced or no fee" permit for residents that change from a wood shake to a non-combustible roof. c) **Replacement of shake roofs upon sale of a home -** Expedite the elimination of wood shake roofs by requiring replacement upon sale.
A.1.b.	**Vent openings -** Screening of vent openings with steel screens, no large than ¼ inch mesh opening, will help prevent embers (during the ember blizzard that comes with a wildfire) from entering into attics and crawl spaces. Currently standards exist in the county and city for new construction, but not older structures. **Maintain 100' of defensible space per PRC-4291.**	1) **Educate resident on importance of steel vent screening -** Educational efforts should be made to insure steel screening, ¼ inch mesh of all vent openings. 2) **Explore incentives for screening -** Explore incentives for homeowners to encourage steel screening of vent openings. 3) **Consider modifying county & city code measures which may include, but not be limited to, requiring steel screening of vent openings upon sale -** Expedite the replacement by requiring steel vent screening with maximum ¼ " mesh upon sale.
A.1.c.	**Decks -** Most solid wood siding, with adequate defensible space as required	1) **Educate resident on importance of fire safe decking -** Educational efforts of the need

	by PRC-4291, is fire resistant enough to withstand the short term heat load from a wildland fire. Then next greatest threat from decks is firefighter safety. Many new materials (synthetics) ignite more easily than wood and have a rapid structural collapse when subjected to high heat loads, creating a situation where firefighters could fall through. Currently no standard exists in local jurisdications. **Maintain 100' of defensible space per PRC-4291.**	for use of safe decking materials. **2) Consider modifying county & city code measures which may include, but not be limited to, prohibiting unsafe synthetic decking -** Prohibit synthetic decking which has a significantly higher flammability, and significantly lower structural rating, than wood of comparable dimension.
A.1.d.	**Outbuildings -** Structures (e.g. storage, wood & tool sheds) with less than 30-feet separation from the home place residences at a high risk of loss. Fire can easily spread from structure to structure due to direct flame contact, fire brand exposure, and/or prolonged radiant heat. **Maintain 100' of defensible space per PRC-4291.**	1) **Educate residents on need for separation of heat loads -** Efforts should be made to educate residents on the need to have separation of heat loads from their residence. Where lot size allows recommend 30' spacing between outbuildings and primary structures. 2) **Enforce clearance requirements -** Enforce clearing of at least 100 feet around structures, a requirement of PRC 4291.
A.1.e.	**Woodpiles -** Woodpiles without adequate separation from homes and outbuildings often place these structures at a high risk of loss. **Maintain 100' of defensible space per PRC-4291.**	1) **Educate residents on need for separation of heat loads -** Efforts should be made to educate residents on the need to keep woodpiles away from structures a distance of 2 times the height of the pile, or more if lot size allows.
A.1.f.	**Propane tanks -** Tanks with less than 10 feet of clearance around the tank and 30' separation from structures place homes at an increased risk of loss.	1) **Educate residents on need for separation of heat loads -** Efforts should be made to educate residents to remove any flammable materials within 10 feet of the tank, and if possible

	Maintain 100' of defensible space per PRC-4291.	position the tank at least 30 feet from structures.
A.1.g.	**Immediate structure landscaping - (0-10')** Certain landscaping (vegetation), such as junipers, landscape materials (bark), and other fine, readily ignitable natural materials such as pine needles and leaves that accumulate on and around structures significantly increase a home's susceptibility to ignition. This area should consist of non-flammable landscape materials and green, succulent vegetation which resists ignition from fire brands. **Maintain 100' of defensible space per PRC-4291.**	1) **Information and education on fire safe landscaping -** Continue to provide information and education to residents on creating fire resistant landscaping adjacent to structures, and keeping structures free of fine, readily ignitable natural materials such as pine needles and leaves that accumulate on and around structures. Emphasis should be on maintaining the home ignition zone (the home plus the first 10 feet around the home) free of readily ignitable fine fuel that will readily accept ignition from firebrands (embers) and perpetuate the lateral spread of fire. 2) **Explore incentives for fire safe landscaping -** Explore incentives for homeowners to make firesafe landscapes adjacent to homes.

The following communities in Butte County and Plumas Counties are listed on the National Registry. See the following site http://www.firesafecouncil.org/fpcommunities.html
An F in the Federal Threat column indicates some or all of the wildland fire threat to that community comes from federal (e.g., US Forest Service, BLM, Dept. of Defense, etc) lands. The Hazard Level code indicates the fire threat level, where 2 denotes moderate threat, and 3 denotes high threat. There are a total of 1,238 communities listed, of which 843 have fire threats from federal lands.

FIRE THREATENED COMMUNITIES IN BUTTE COUNTY

No.	Community Name	Federal Threat	Hazard Level
62	Bangor		3
90	Berry Creek	F	3
156	Butte Creek	F	3
157	Butte Meadows	F	3
211	Centerville	F	3
215	Cherokee	F	3
220	Chico	F	3
240	Cohasset	F	3
251	Concow	F	3
367	Feather Falls	F	3
385	Forest Ranch	F	3
519	Inskip	F	2
539	Jonesville	F	3
669	Magalia	F	3
815	Oroville	F	3
816	Oroville East	F	3
823	Palermo	F	3
832	Paradise	F	3
847	Pentz	F	3
941	Robinson Mills	F	3
1058	South Oroville	F	3
1078	Stirling City	F	3
1113	Thermalito		3

FIRE THREATENED COMMUNITIES IN PLUMAS COUNTY

Plumas County	Community[1]	On Draft List[2]	Estimated Population[3]	Estimated Area (sq. mi.)[4]	Density (people/sq. mi.)
1	Beckwourth	No	100	2.00	50
2	Belden	No	15	0.25	60
3	Blairsden	No	200	0.50	400
4	Bucks Lake	No	50	2.00	25
5	Canyon Dam	No	100	0.50	200
6	Caribou	No	25	0.50	50
7	Chester	Yes	2000	1.50	1333
8	Clio	No	200	0.50	400
9	Cresent Mills	No	100	0.50	200
10	Cromberg	No	200	1.00	200
11	Delleker	No	75	0.50	150
12	East Quincy	Yes	2000	2.00	1000
13	Genesee	No	20	0.25	80
14	Graegle	No	300	1.00	300
15	Greenville	Yes	1500	2.00	750
16	Hamilton Branch	No	200	1.00	200
17	Indian Falls	No	20	0.25	80
18	Johnsville	No	50	0.25	200
19	LaPorte	No	150	2.00	75
20	Meadow Valley	No	500	1.00	500
21	Mohawk	No	100	0.50	200
22	Paxton	No	20	0.20	100
23	Portola	Yes	4000	2.00	2000
24	Pratville	No	50	0.50	100
25	Quincy	Yes	2000	1.50	1333
26	Seneca	No	100	1.00	100
27	Taylorsville	No	200	0.10	2000
28	Twain	No	15	0.10	150

Plumas County Communities recommended but not currently listed

Plumas County	Community[1]	On Draft List[2]	Estimated Population[3]	Estimated Area (sq. mi.)[4]	Density (people/sq. mi.)
1	Chicoot	No	70	0.50	140
2	C-Road	No	100	1.00	100
3	Gold Mountain	No	200	2.00	100
4	Gold Ridge	No	50	1.00	50
5	Greenhorn	No	200	2.00	100
6	Lake Almanor	No	200	0.50	400
7	Lake Almanor West	No	200	1.00	200

8	Little Grass Valley	No	100	1.50	67
9	Plumas Eureka	No	100	0.50	200
10	Rich Bar	No	10	0.20	50
11	Sloat	No	100	0.50	200
12	Spring Garden	No	50	0.50	100
13	Storrie	No	10	0.10	100
14	Tobin	No	10	0.10	100
15	Whitehawk	No	200	2.00	100

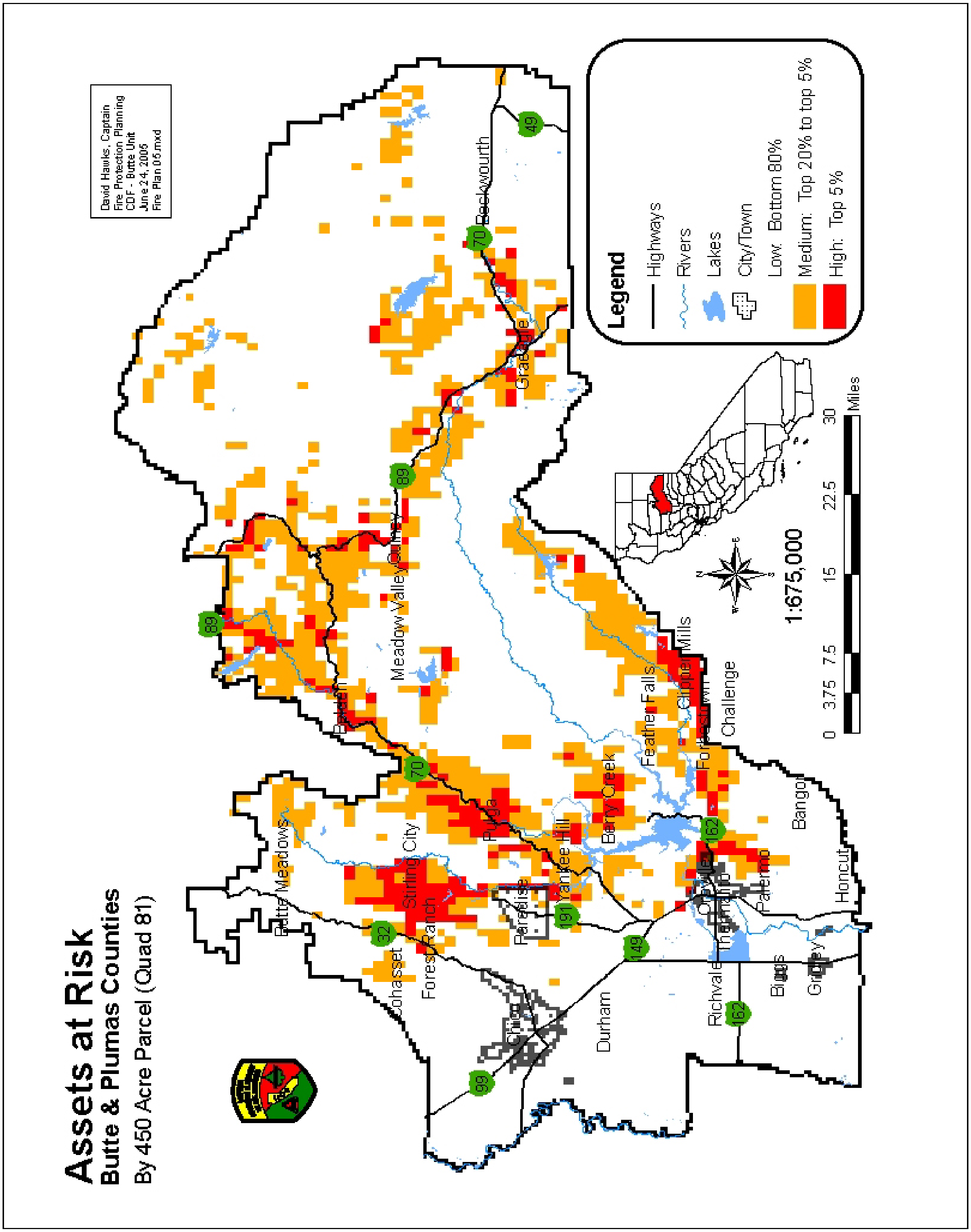
The following maps display the wildland urban interface problem within Butte and Plumas Counties.

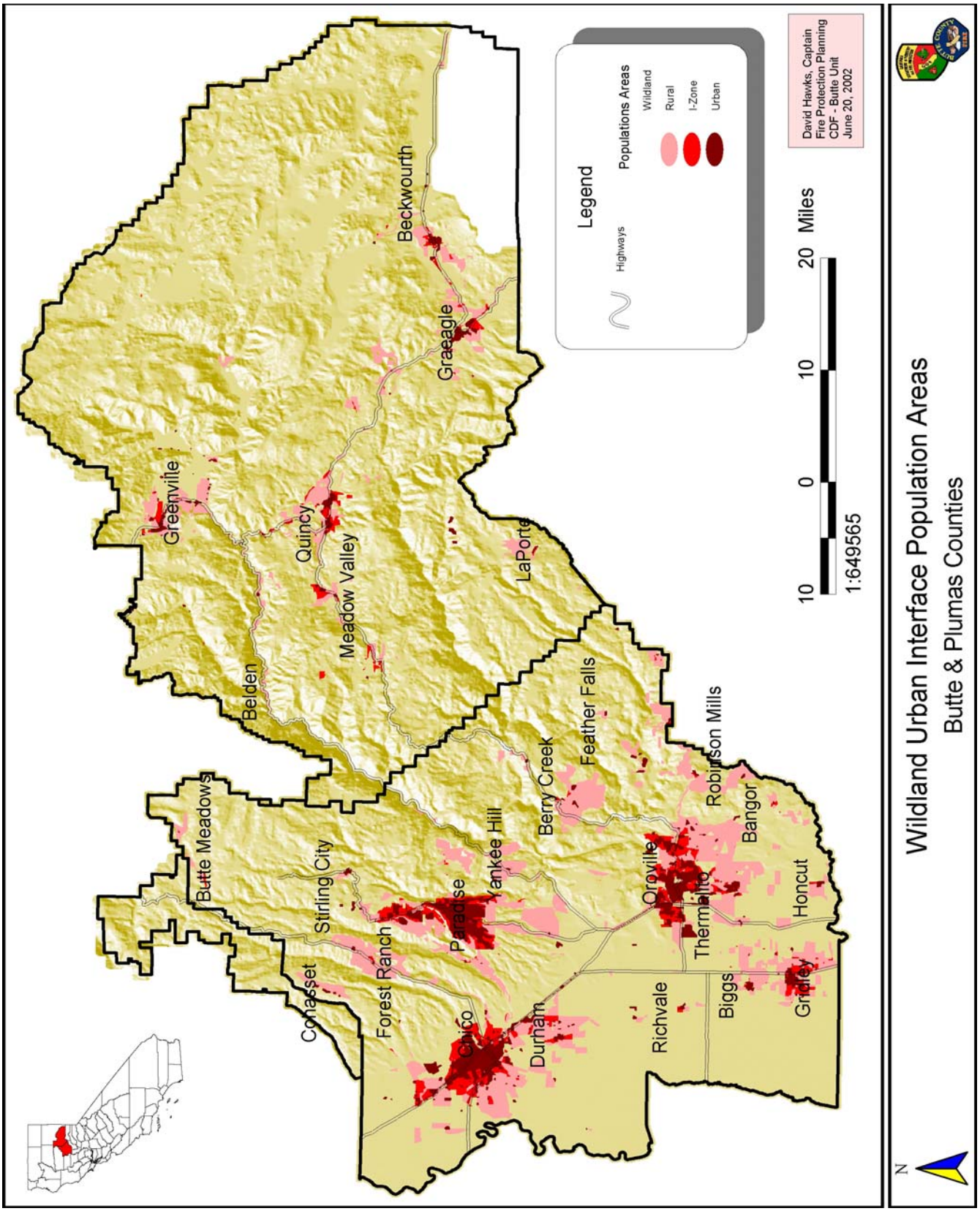
The "Total Assets at Risk" map uses an aggregate score for all assets at risk based on assigned weights for each category. The assets at risk include: hydroelectric power, watersheds, soil erosion, water storage and supply, scenic, timber, range, air quality, historic buildings, recreation, structures, non-game wildlife, infrastructure and ecosystem health. The analysis shows concentrations of medium to high risk areas in the communities of Cohasset, Forest Ranch, Paradise, Paradise Pines, Butte Meadows, Pulga, Yankee Hill, Concow, Kelly Ridge (East Oroville), Palermo, Berry Creek, Robinson Mill, Feather Falls and Bangor. Several communities in Plumas County also are shown as a medium to high risk including many of those along the Highway 70 corridor from Tobin to Portola (Belden, Quincy, Cromberg, Blairsden & Portola) as well as Graegle, Meadow Valley, Bucks Lake, and LaPorte to name a few.

The following table represents the weights (1-5) applied to each asset as used to compute the overall Asset Rank within the Butte Unit (Butte & Plumas Counties).

Asset	**Weight**	**Asset**	**Weight**	**Asset**	**Weight**
Infrastructure	3	Timber	3	Storage (Water)	3
Water Supply	4	Range	1	Fire-Flood	2
Historic	2	Soil	1	Air	4
Scenic	2	Hydroelectric	3	Recreation	2
Housing	5	Non-game Wildlife	1	Game (Wildlife)	1
Ecosystem	3				

From the "Population Density" and "Wildland Urban Interface Population Areas" maps, large concentrations of people have been identified in the Chico, Paradise, Paradise Pines, and east and south Oroville areas of Butte County, and the Quincy, Greenville, Beckwourth and Graegle areas of Plumas County. The density is based upon census block information from the 2000 census. Census blocks are not geographically similar in size; however the severity of the urban interface problem can be inferred from the population density and hence housing density. Two thousand census data indicates that the average number of residents per household is 2.48 and 2.29 for Butte and Plumas Counties respectively.


Assets at Risk
Butte & Plumas Counties
By 450 Acre Parcel (Quad 81)
David Hawks, Captain
Fire Protection Planning
CDF - Butte Unit
June 24, 2005
Fire Plan 05.mxd
Legend
Highways
Rivers
Lakes
City/Town
Low: Bottom 80%
Medium: Top 20% to top 5%
High: Top 5%
1:675,000
0 3.75 7.5 15 22.5 30
Miles
Beckwourth
Graeagle
Meadow Valley
Quincy
Butte Meadows
Stirling City
Forest Ranch
Cohasset
Chico
Durham
Paradise
Magalia
Pulga
Yankee Hill
Berry Creek
Feather Falls
Clipper Mills
Forbestown
Challenge
Bangor
Oroville
Thermalito
Palermo
Honcut
Richvale
Biggs
Gridley


Wildland Urban Interface Population Areas
Butte & Plumas Counties
David Havlks, Captain
Fire Protection Planning
CDF - Butte Unit
June 20, 2002
Legend
Highways
Populations Areas
Wildland
Rural
I-Zone
Urban
10 0 10 20 Miles
1:649565
N
Beckwourth
Graeagle
Greenville
Quincy
Meadow Valley
LaPorte
Belden
Feather Falls
Berry Creek
Robinson Mills
Bangor
Oroville
Thermalito
Honcut
Yankee Hill
Paradise
Stirling City
Butte Meadows
Forest Ranch
Chico
Durham
Richvale
Biggs
Gridley
Concset